

SETPOINT STANDARD	Manual Document Page Issue Date	GCX-2 Engineering TFC-ENG-STD-14, REV C-2 1 of 4 September 18, 2014

1.0 PURPOSE AND SCOPE

(5.1.1)

This standard identifies how to determine and document safety significant instrumentation set-points, which may also be applied to general service instrumentation set-points that affect safety of life, health or property. This standard does not provide the detailed calculation methodology necessary for generating setpoints. It does require a graded approach to setpoint determination.

This standard, applies to the Tank Operations Contractor (TOC) evaluations for determining instrumentation setpoints for instruments used to verify parameters for Technical Safety Requirement compliance (TFC-PLN-02).

2.0 IMPLEMENTATION

(5.1.3)

The design margin between the set point and the safety analysis limit is determined using prudent engineering judgment.

Inputs to setpoint evaluation may include other engineering evaluations of process models and safety limits. These other evaluations are not necessarily setpoint evaluations. Although, they may include similar engineering analysis, calculations, technical evaluations, and reports. One example of such input that does not determine any setpoint is, RPP-RPT-52829, "Methodology for Placement of Thermocouples for Freeze Protection in Waste Transfer Structures."

A graded approach shall be used to determine rigor of set point uncertainty evaluation. The graded approach shall be based on risk and design margin as laid out in the Technical Report from International Society of Automation, ANSI/ISA TR67.04.09-2005, "Graded Approaches to Setpoint Determination."

Calculation of uncertainties, for grade category 1 (see attachment A, Classification Flowchart), shall consider the instrument error sources and the uncertainty calculation methods enumerated in ANSI/ISA S67.04.01-2006 (R2011), "Setpoints for Nuclear Safety-Related Instrumentation."

This standard is effective on the date shown in the header.

3.0 STANDARD

(5.1.2, 5.1.3, 5.1.4, 5.1.5)

1. Graded approach to set point determination shall be applied as summarized in Attachment A, from ANSI/ISA TR67.04.09. This technical report provides more thorough explanation of Attachment A, and is compact and well presented, and should be read before using Attachment A to make a grading determination.
2. For grade category 3 utilities and support equipment, e.g., air compressors, and other systems that are not safety significant, there is no requirement to perform, or document a setpoint evaluation. However, consideration should be given to apply category three to setpoints affecting safety of life, health, or property.
3. Whenever practicable, setpoint evaluation shall be conducted sufficiently early in the design process to assist with specification of process sensing instrument range and other

factors effecting uncertainty of setpoint, so as to provide a sufficiently robust design margin between setpoint and safety analysis limit, to be deemed grade category 2.

4. The method(s) by which setpoints are determined shall be documented. The documentation shall include:
 - Compliance with Technical Reviews, TFC-ENG-DESIGN-C-52
 - For grade category 1, an engineering calculation per TFC-ENG-DESIGN-C-10
 - For grade category 2 or 3, a technical evaluation per TFC-ENG-FACSUP-C-03, or optionally, an engineering calculation per TFC-ENG-DESIGN-C-10
 - For uncertainties, justification of use of any statistical accrual methods other than arithmetic addition (i.e., documented evidence of 'random' or 'normal' distribution, including a repeatable description of sample population, size, date, source, sampling methods and data)
 - Uncertainties for instruments that have been calibrated since leaving the manufacturer shall be accounted for using arithmetic addition, not statistical accrual methods.
5. Minimum documentation of setpoint determination is listed within Attachment A.

4.0 DEFINITIONS

Allowable value. If an “Allowable Value” is included, it should be an upper limit of a performance test acceptance criterion. (from ANSI/ISA S67.04.01)

Analytical limit. Limit of a measured or calculated variable established by the safety analysis to ensure that a safety limit is not exceeded. (from ANSI/ISA S67.04.01)

Uncertainty. Amount to which an instrument channel’s output is in doubt (or the allowance made therefore) due to possible errors, either random or systematic, that have not been corrected. The uncertainty is generally identified within a probability and confidence level.

Instrumentation. As appearing in the scope and purpose of this standard, instrumentation is any device or system that is sensitive to process condition and capable of registering or reacting to a process setpoint at which a predetermined action is to be executed. This may include mechanical, electrical and other devices or systems that are not usually identified as instruments or instrumentation, if they are safety significant, or for other reasons are considered for formal setpoint evaluation and documentation.

5.0 SOURCES

5.1 Requirements

1. DOE O 252.1A, “Technical Standards Program.”
2. DOE O 420.1B, “Facility Safety.”
3. Standard industry practice.

4. TFC-ENG-DESIGN-C-10, "Engineering Calculations."
5. TFC-ENG-DESIGN-C-52, "Technical Reviews."

5.2 References

1. ANSI/ISA-TR67.04.09-2005, "Graded Approaches to Setpoint Determination."
2. ANSI/ISA-S67.04.01--2006 (R2011), "Setpoints for Nuclear Safety-Related Instrumentation."
3. ANSI/ISA-RP67.04.02-2010, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation."
4. 10 CFR 830, "Nuclear Safety Management."
5. DOE O 433.1B, "Maintenance Management Program for DOE Nuclear Facilities."
6. TFC-ENG-DESIGN-C-06, "Engineering Change Control."
7. TFC-ENG-DESIGN-C-25, "Technical Document Control."
8. TFC-ENG-DESIGN-P-07, "System Design Descriptions."
9. TFC-ENG-FACSUP-C-03, "Technical Evaluations."
10. TFC-OPS-MAINT-C-01, "Tank Operations Contractor Work Control."
11. TFC-OPS-MAINT-C-06, "Notification and Evaluation of Out-of-Calibration Measuring and Test Equipment."
12. TFC-OPS-MAINT-C-07, "Control and Calibration of Measuring and Test Equipment."
13. TFC-OPS-MAINT-STD-01, "Calibration/Functional Test Status Labeling of Plant Instruments."
14. TFC-PLN-02, "Quality Assurance Program Description."

ATTACHMENT A – CLASSIFICATION FLOWCHART (from ANSI/ISA TR67.04.09)

Default - Category 1 – DOWNGRADE IF:	
The accident or safety analysis methods or assumptions can be shown to be conservative enough to easily bound expected uncertainties; a factor of 2 is generally considered acceptable	All indications, interlock values, setpoints, test acceptance criteria, and action points that are not important to safety.
The margin between the set point or operating limit and the accident or safety analysis limit easily bounds the expected uncertainty; a factor of 2 is generally considered acceptable.	Non-safety related, non-safety significant plant control instrument channels.
The accident or safety analysis is insensitive to changes in the parameter.	Instrument channels not included in Technical Specifications, but used to support operability of TS systems (by their exclusion from TS, these systems have already been judged less important)
	Parameters that define TS modes (these are nominal values)
	Parameters that define LCO applicability (these are nominal values)
	TS Surveillance Requirements that verify the rate of change of a parameter.
Category 2	Category 3

Category 1 – Stringent -- Instrument uncertainties shall be applied. Uncertainties shall be calculated in accordance with ISA S67.04.01 and ISA RP67.04.02. All applicable uncertainty contributors shall be considered.

Formal documentation of the basis for classification and of the calculation shall be developed and maintained.

Category 2 – Relaxed -- Instrument uncertainties shall be considered. Uncertainties may be estimated using similarity, engineering judgment, and other less rigorous, less stringent methods, or an uncertainty calculation may be done. Alternately, a qualitative determination that the margin is large compared to the instrument uncertainty is adequate in lieu of an uncertainty estimate or calculation.

Formal documentation of the basis for classification and of the estimate or calculation or determination shall be developed and maintained, as minimum:

- A description of the instrument channel and it's required functions
- What makes this particular channel function safety significant (protects fission product barrier, mitigates the effects of design basis accidents, etc.)
- A qualitative or quantitative discussion of the basis for classification of the conservatism in the analyses, the margin in the set point or limit, or the insensitivity of the analyses.

Category 3 – Other -- Interlock values, set points, test acceptance criteria, and action points shall be chosen by engineering judgment, with margins for instrument uncertainties included and documented in appropriate procedures, databases, drawings, or other documents.

Where the basis for classification into Category 3 is clear, the basis for classification and the estimate of instrument uncertainty do not need to be formally documented. Documentation shall be provided if there is a possibility that the instrument channel's classification could come into question:

- A description of the instrument channel and it's required functions
- A qualitative or quantitative discussion of the basis for classification - why each channel function is not safety significant.
- A qualitative or quantitative estimate of the instrument channel's uncertainty.